



NOAA's LRIT Development Status

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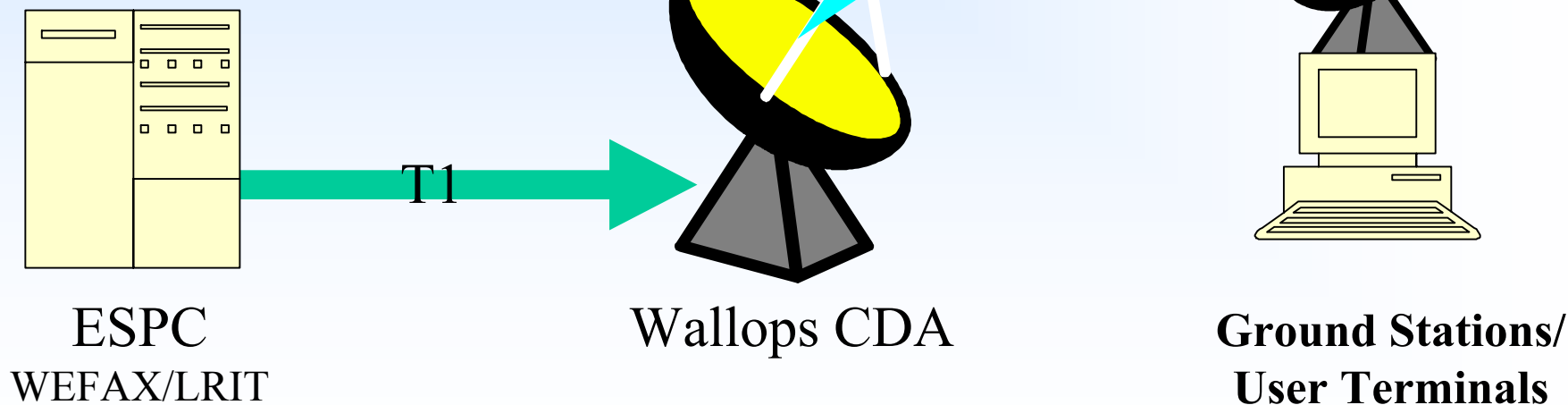


Background

- **WEFAX and LRIT are considered Low Data Rate Geostationary Meteorological Satellite Direct Broadcast Services**
- **In the 1990's the Coordination Group for Meteorological Satellites (CGMS) began developing LRIT standards per recommendation of the World Meteorological Organization (WMO)**
- **NOAA must implement LRIT on GOES-N,O,P series**
- **NOAA began implementation on GOES K,L,M series (current spacecraft) in 2003**

Low Data Rate Direct Broadcast

WEFAX and LRIT data are processed in ESPC, sent to the Wallops CDA via T1, uplinked to the GOES spacecraft, and broadcast to end users.





LRIT – NOAA's Low Rate Information Transmission System

- S-Band broadcast of low rate digital data (128 kb/s) using CCSDS formatting, to be 24 hours a day on GOES East and West. Products include GOES, NWS Data, GMS, DCS, text messages, and more.
- New system to replace WEFAX.
- First successful End-to-End testing July 8-10 of 2003.
- Transition from WEFAX to LRIT will be performed over several years and involve time sharing of the WEFAX transponder (GOES I-M only).



LRIT



CONFIGURATION ITEMS

- System comprised of several different hardware platforms:
 - – GOES Ingester : HP server/HP UNIX (AFEP)
 - – LRIT Product Processor : Dell server/LINUX
 - – CCSDS Preprocessor : IBM server/LINUX
 - – CCSDS processor : AVTEC PTP/NT (COTS)
 - RF Modulator : Agilent Technologies
 - RF Switch : IBM Server/NT (transition only)
 - – User receive station: IBM/Win 2000



The Transition to LRIT

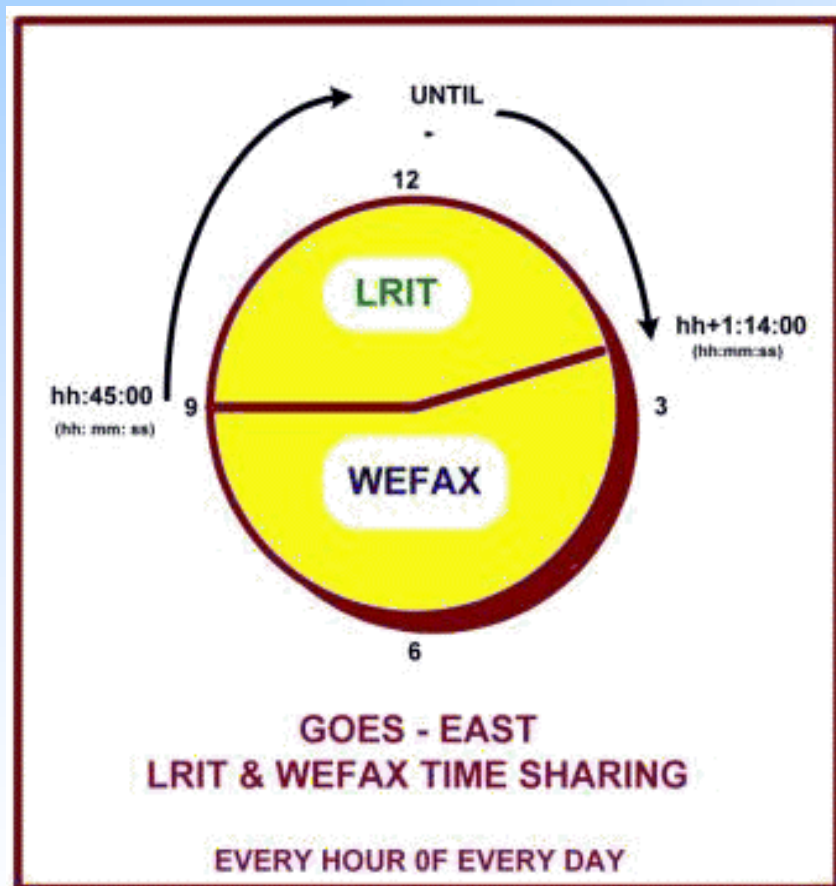


HAS BEGUN ...

- ...

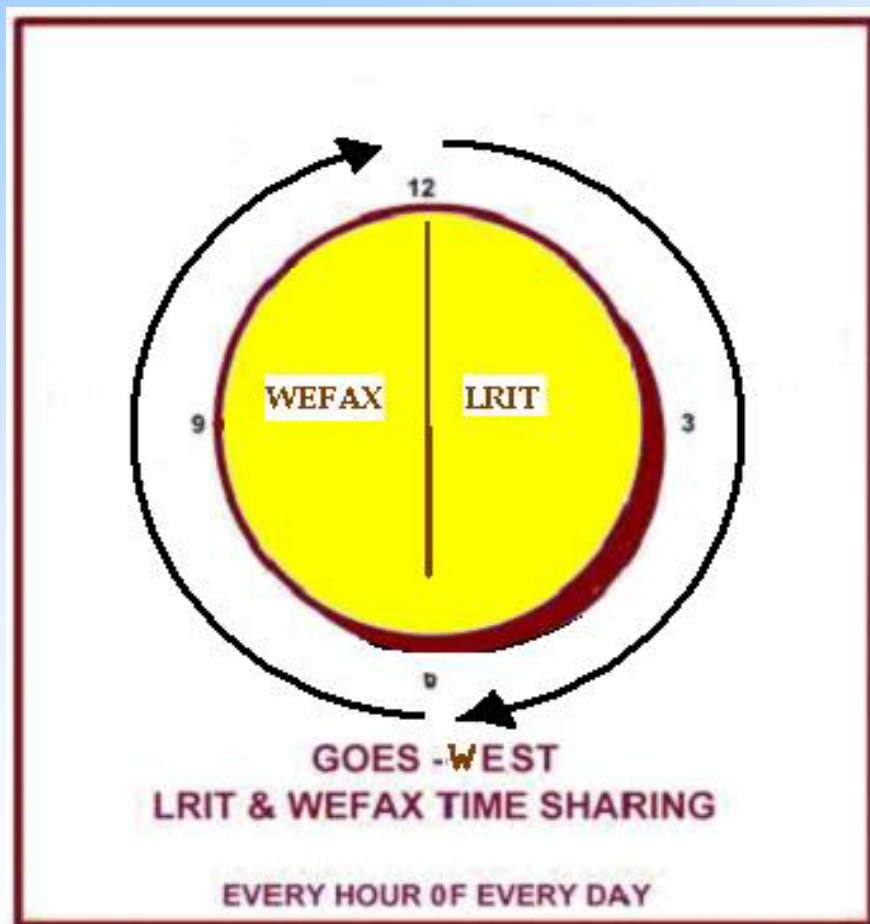
- Started in August 2003 with LRIT data being transmitted (Monday through Friday) during the WEFAX vacant times, twice daily.
 - first daily test transmission period from 16:50 to 17:06 UTC.
 - second daily test transmission period from 17:50 to 17:58 UTC.

Transition to LRIT Continues



- Alternating LRIT and WEFAX transmissions on GOES-East began in October 2003
 - 29 minutes LRIT
 - 31 minutes WEFAX
- Will continue to March 2005

LRIT GOES-West



- Alternating LRIT and WEFAX transmissions on GOES-West began in October 2004
 - 30 minutes LRIT
 - 30 minutes WEFAX
- Will continue to October 2005



SOME ADVANTAGES of LRIT

- **More data**
- **Reduced latency**
- **More diverse product suite**
- **Improved image resolution**
- **Compression for better bandwidth utilization**
- **Improved user flexibility**

Increased product capacity, flexibility and timeliness



ADVANTAGES of LRIT

“More Data”





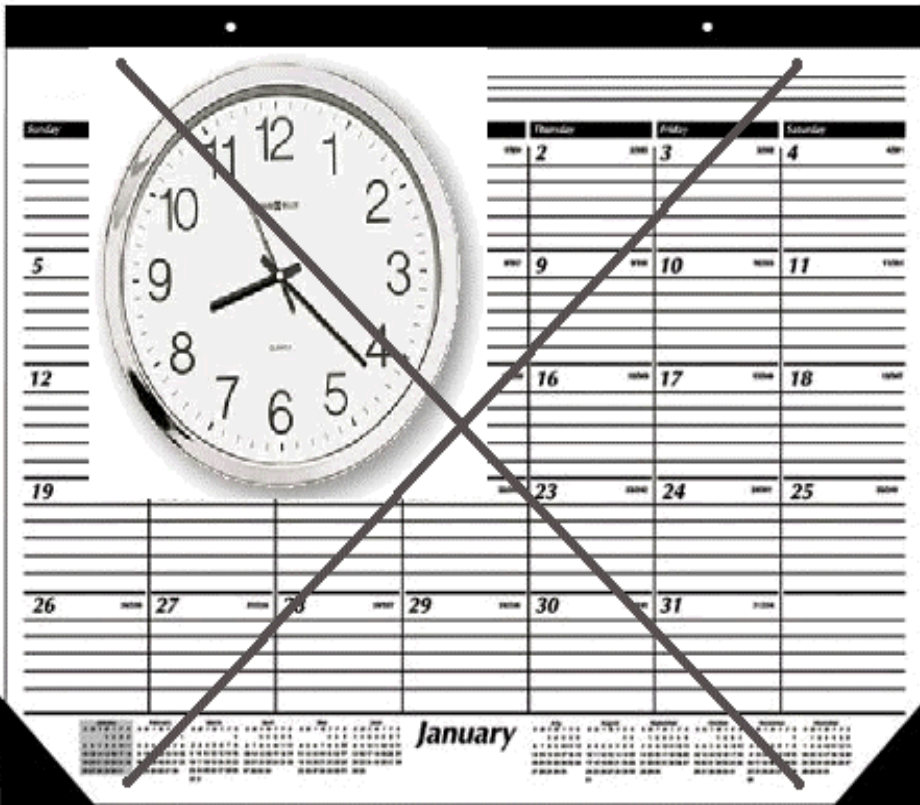
- Amount of LRIT Data in the current timeshare mode ~ 31.6 MB per 30 minute timeshare period
- Amount of LRIT Data possible in 24 hours -- 1.5 GB per day
- Compression allows for more data
 - File compression (JPEG, Zip)
 - Packet compression (Rice)
 - Up to 30% reduction in size

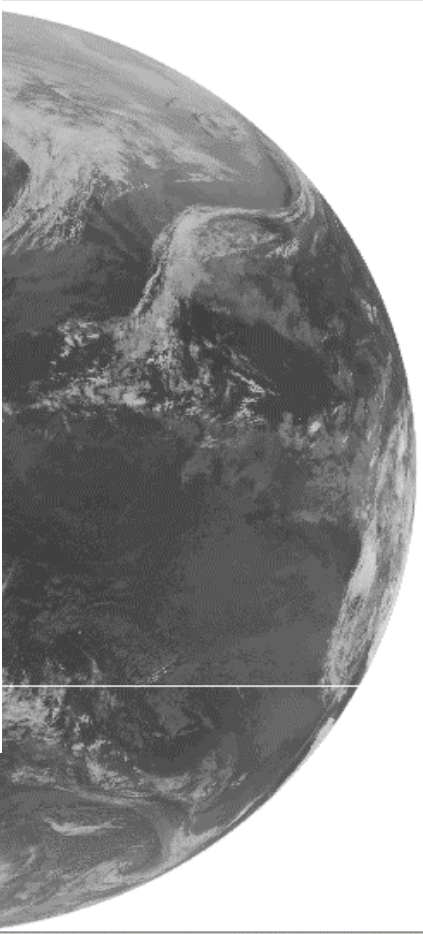
ADVANTAGES of LRIT


LRIT Viewer

File Help









ADVANTAGES of LRIT

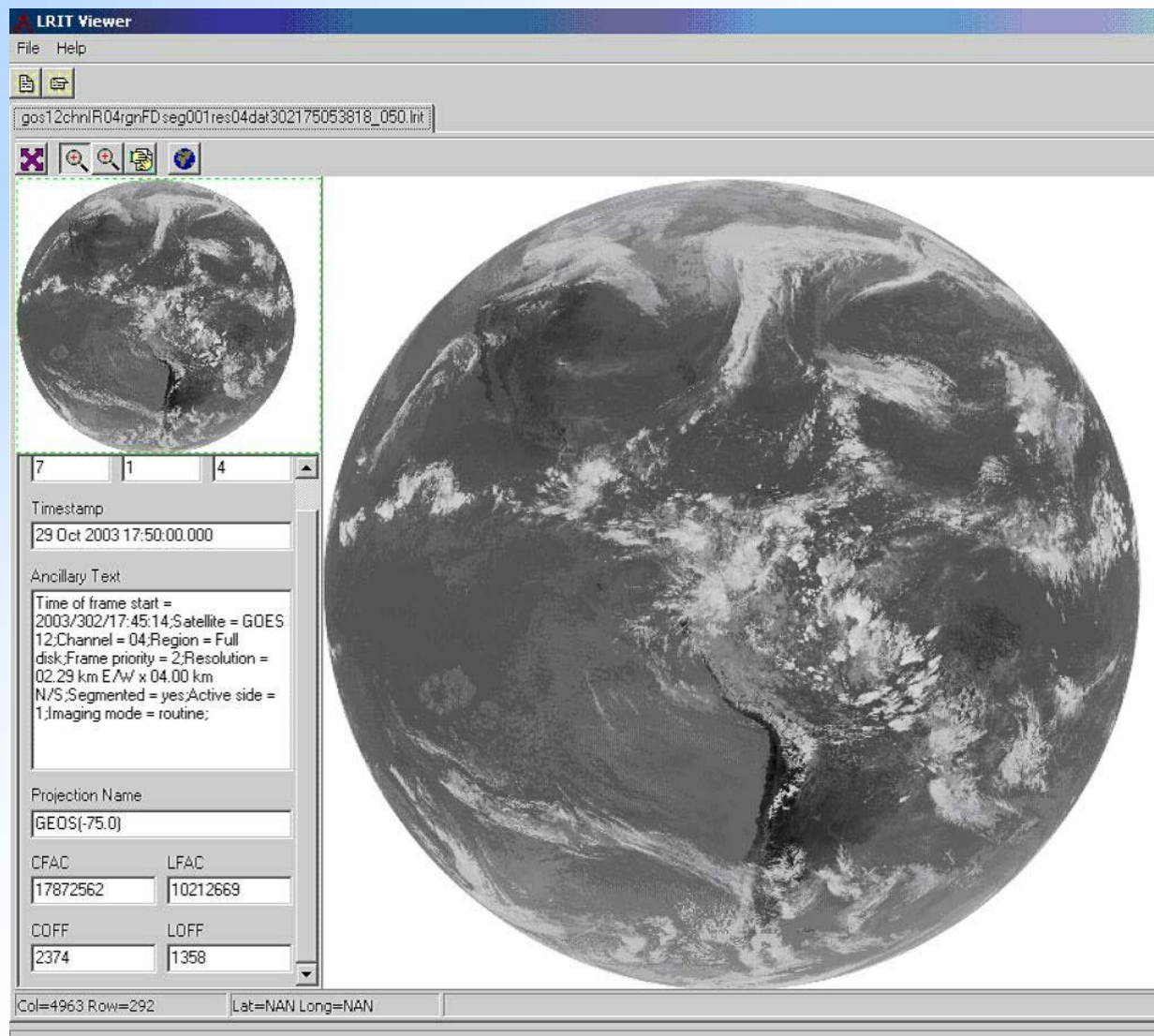
“More Diverse Product Suite”

- **Used WEFAX as a baseline**
- **GOES primary data source**
- **NOAA’s National Weather Service to provide:**
 - **Various charts**
 - **Selected EMWIN messages**
- **GMS (currently GOES-9)**
- **GOES Data Collection Service**
- **Evolving Capabilities and Products**

ADVANTAGES of LRIT

“Improved Image Resolution”

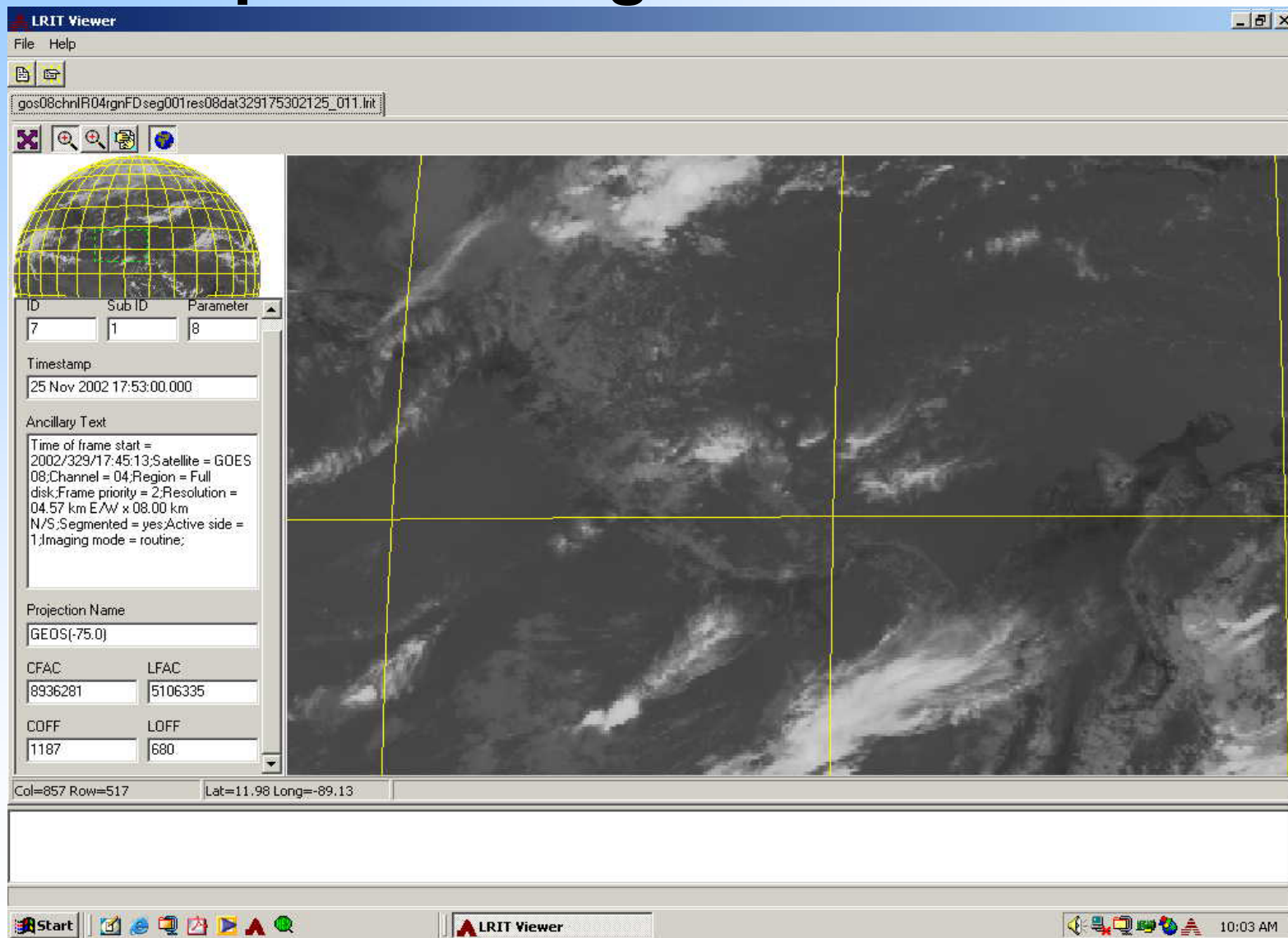
- Higher resolution GOES products to the users
 - 16 km full disk standard with WEFAX
 - 4 km full disk standard with LRIT



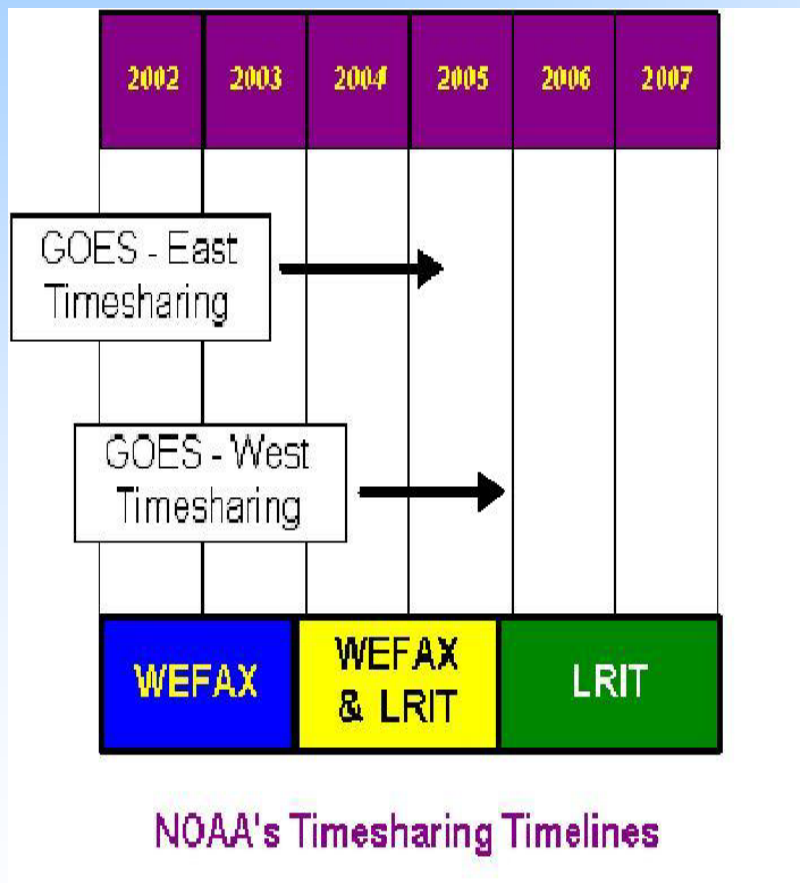


ADVANTAGES of LRIT

“Improved Image Resolution”



LRIT Transition Plans



- GOES – East timesharing continues until March 2005
- GOES-West timesharing began Fall 2004
- Full Time, all LRIT, by the end of 2005



Summary

- LRIT is an Integrated Stream of Diverse Digital Products that can be Transmitted Asynchronously and has Reduced Latency, Improved User Flexibility, Increased Product Resolution, and Increased Reliability compared to WEFAX
- Consideration of LRIT users and value added providers including efficient transition through service overlaps
- **The Transition to Operations of NOAA's LRIT System Is Underway**



LRIT Links

Email: LRIT@NOAA.GOV

**For everything you wanted to know about LRIT at NOAA:
<http://noaasis.noaa.gov/LRIT/>**

Operational info: <http://www.osdpc.noaa.gov/COB/COB.html>



ADDITIONAL SLIDES



Comparison of Services

WEFAX

(Weather Facsimile)

Transmits only images using low rate analog facsimile, 24 hours a day on a fixed schedule of 4 and 5 minute time slots.

LRIT

(Low Rate Information Transmission)

Integrated stream of diverse products that can be transmitted asynchronously on an as-available basis.



LRIT User Terminal General Requirements

- CGMS Compatibility (CCSDS)
- Reliable RF Performance
- Low Cost



LRIT User Terminal Low Cost Considerations

- WEFAX RF compatibility
- NOAA provided software
 - Basic receive processing
 - Basic data management
 - Basic viewing
- Value added capability



LRIT User Terminal Basic Components



Receiver

- **1 meter dish**
- **Low noise amplifier**
- **Down converter**
- **Demodulator**

Workstation

- **PC**
- **Software**
 - **CCSDS LRIT processing**
 - **File handling**
 - **Viewing**



GOES Data Collection System (DCS)

- GOES DCS data inserted into the LRIT data stream will originate at Wallops
- Data Priority: High, Medium, Low
- Data Format: (concatenated files)
- Receiver Application: ??
- Data Compression: None currently, Zip in testing



Sample DCS data file

pH-03346145527-A.dcs

☐☐CE32A1AE03346145508G36-

5NN031E9200197B1J@E`@UpACz@E{ @EK@UpACz@Ez
@EE@UpACz@Ez@EB@UpACz@Ey@EQ@UoACz@Ey@D | @U
oACz@Ex@EE@UpACz@Ey@EL@UpACz@Ex@D { @UoACz@
Ex@EE@UoACz@Ex@Dz@UoACz@Ex@Dv@UoACz@Ex@EF
@UmACz@Ew@Dz@UmACz@Ev@D | @UmACz@Ev@D } @UmAC
z@EvJ @OêS



LRIT User Terminal Receiver Screen Shot



LRIT Receiver - Default.lrit

File Edit Help

Physical State: Running/Lock

Bytes Received: 300018688

Frames Received: 4487295

Frames Processed: 4487295

Error Frames: 0

RS Error Frames: 0

Correctable Frames: 0

Fill Frames: 4453912

Packets Received: 3634

Packets Processed: 3634

Fill Packets: 22

VCID	APID	APID	Packets	Temporary Filename	Status	Bytes	SeqErrors	CRC Errors
	96		2744		Complete	22467567	0	0
	1314		106		Searching...	0	0	0
	1315		111		Complete	901613	0	0
	1316		110		Complete	894991	0	0
	1568		18		Complete	142296	0	0
	1569		18		Complete	142296	0	0
	1570		18		Complete	142296	0	0
	1571		18		Complete	142296	0	0
	1572		17		Complete	138015	0	0
	1600		14		Complete	108343	0	0
	1603		19		Complete	148681	0	0
	1604		19		Complete	148681	0	0
	1605		19		Complete	148681	0	0
	1606		19		Complete	148681	0	0
	1607		18		Complete	144541	0	0
	1632		39		Complete	317794	0	0
	1633		39		Complete	317794	0	0
	1634		39		Complete	317794	0	0
	1635		28		Complete	226101	0	0
	1636		28		Complete	226101	0	0
	1637		28		Complete	226101	0	0
	1638		28		Complete	226101	0	0
	1639		28		Complete	224446	0	0
	1664		87		Complete	706695	0	0

26 Nov 2002 17:39:28: C:\Program Files\LRIT User Station\Temp\26Nov2002h1739s22ms796.tmp successfully transferred. APID=1600 Bytes=108343 SeqErrs=0 CrcErrs=0

26 Nov 2002 17:39:28: Saved C:\Program Files\LRIT User Station\Output Folder\gos08chnlR04rgnSHseg003res08dat329204519148_013.lrit

26 Nov 2002 17:39:48: C:\Program Files\LRIT User Station\Temp\26Nov2002h1739s29ms453.tmp successfully transferred. APID=1633 Bytes=317794 SeqErrs=0 CrcErrs=0

26 Nov 2002 17:39:48: Saved C:\Program Files\LRIT User Station\Output Folder\gos08chnlR04rgnNHseg001res08dat329202110571_012.lrit

26 Nov 2002 17:40:08: C:\Program Files\LRIT User Station\Temp\26Nov2002h1739s49ms484.tmp successfully transferred. APID=1634 Bytes=317794 SeqErrs=0 CrcErrs=0

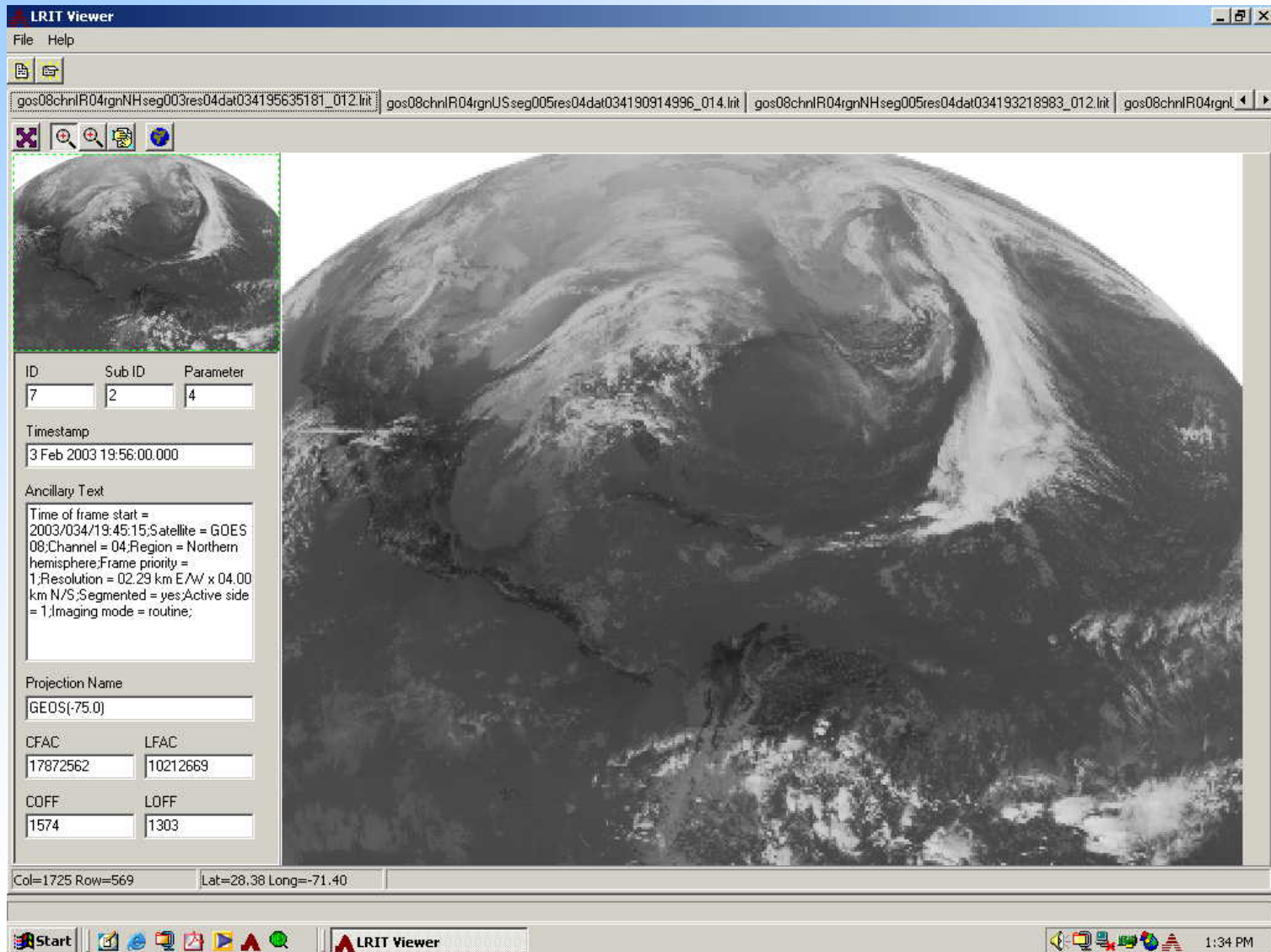
26 Nov 2002 17:40:08: Saved C:\Program Files\LRIT User Station\Output Folder\gos08chnlR04rgnNHseg002res08dat329202405333_012.lrit

26 Nov 2002 18:06:08: C:\Program Files\LRIT User Station\Temp\26Nov2002h1805s49ms281.tmp successfully transferred. APID=1632 Bytes=317794 SeqErrs=0 CrcErrs=0

26 Nov 2002 18:06:08: Saved C:\Program Files\LRIT User Station\Output Folder\gos08chnlR04rgnNHseg001res08dat329182109975_012.lrit

Start | LRIT Viewer | LRIT Receiver | 9:28 AM

LRIT User Terminal Viewer Screen Shot





LRIT User Terminal Viewer Screen Shot

